REMARKS

In section 5 of the Office Action, the Examiner rejected claims 6 and 7 under 35 U.S.C. §102(b) as being anticipated by Hartsough.

As described in Hartsough, a sputtering apparatus 20 includes an enclosure 22 that defines a process chamber 24. A substantially circular rotatable table 26 is centrally located in the process chamber 24 and positions a substrate 40 under a cathode 28 to receive sputtered metal. An inlet 29 supplies a reactive gas, such as oxygen, from a source 31 to the interior of the enclosure 22 under control of a flow controller 30. An inlet 32 supplies an inert gas, such as argon, from a source 34 to the process chamber 24 under control of a flow controller 33.

A vacuum pump operating through a pumping conduit 35 reduces the gas pressure in the process chamber 24 to a pressure appropriate for sputtering.

The cathode 28 provides a source of metal atoms which are sputtered onto the substrate 40. The cathode assembly 28 includes an aluminum target 56 that faces the rotatable table 26. A shield 60 surrounds the target 56 and extends downwardly into proximity of the rotatable table 26. The shield 60, the cathode 28, and the rotatable table 26 beneath the shield 60 together define a sputtering zone 62

which is filled with argon. The shield 60 separates the sputtering zone 62 from other portions of the process chamber 24.

When the cathode 50 is energized, argon ions impinge on the target 56 to sputter aluminum atoms from the target 56 to the substrate 40. The rotatable table 26 moves the substrate 40 out from under the target 56 into a reaction zone 70 which is filled with oxygen. The oxygen reactive atmosphere reacts with the freshly sputtered aluminum on the substrate 40 to produce aluminum oxide. The oxidation is completed before the substrate 40 is swept back into the sputtering zone 62 by motion of the rotatable table 26 where another layer of aluminum is sputtered onto the substrate 40. The sputtering of metal through the inert argon atmosphere followed by reaction in a reactive gas atmosphere is repeated until the aluminum oxide film on the substrate 40 reaches a desired thickness.

Independent claim 6 recites formation of a thin film having an optical characteristic value in a region where a hysteresis phenomenon occurs. The hysteresis phenomenon is the difference in the optical characteristic between the case where the reactive gas flow rate is increased and the case where the reactive gas flow rate is decreased. The region where the hysteresis phenomenon occurs is in a range where

the reactive gas introduced during sputtering has a flow rate of 15 sccm or less, which does not include 0 sccm.

Hartsough does not disclose or suggest formation of a thin film having an optical characteristic value in a region where a hysteresis phenomenon occurs, where the hysteresis phenomenon occurs in a range where the reactive gas introduced during sputtering has a flow rate of 15 sccm or less, which does not include 0 sccm.

Indeed, Hartsough does not disclose or suggest formation of a thin film having an optical characteristic and does not deal with the problem of controlling the optical characteristic of the thin film in the region where the optical characteristic exhibits hysteresis.

Therefore, independent claim 6 is not anticipated by Hartsough.

Because independent claim 6 is not anticipated by Hartsough, dependent claim 7 is likewise not anticipated by Hartsough.

In section 7 of the Office Action, the Examiner rejected claim 8 under 35 U.S.C. §103(a) as being unpatentable over Hartsough in view of Sproul.

However, Sproul likewise does not disclose or suggest adjusting a film composition of a finally formed thin film so that the thin film has an optical characteristic

value in a region where a hysteresis phenomenon occurs, where the hysteresis phenomenon occurs in a range where the reactive gas introduced during sputtering has a flow rate of 15 sccm or less, which does not include 0 sccm.

Therefore, independent claim 6 is not unpatentable over Hartsough in view of Sproul.

Because independent claim 6 is not unpatentable over Hartsough in view of Sproul, dependent claim 8 cannot be unpatentable over Hartsough in view of Sproul.

Newly added independent claim 11 specifies that a substrate is repeatedly conveyed between a sputtering zone and a reactive zone at a conveying speed that adjusts an optical characteristic of the thin film in a hysteresis region where the optical characteristic is different depending upon whether a flow rate of the reactive gas is increased or is decreased.

Neither Hartsough nor Sproul discloses the control of the conveying speed of a substrate so as to control the optical characteristic of a thin film in the hysteresis region of the optical characteristic.

Therefore, independent claim 11 is not unpatentable over Hartsough in view of Sproul.

Because independent claim 11 is not unpatentable over Hartsough in view of Sproul, dependent claims 12-14 cannot be unpatentable over Hartsough in view of Sproul.

CONCLUSION

In view of the above, the claims of the present application patentably distinguish over the art applied by the Examiner. Accordingly, allowance of these claims and issuance of the present application are respectfully requested.

The Commissioner is hereby authorized to charge any additional fees that may be required, or to credit any overpayment, to account No. 501519.

Respectfully submitted,

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